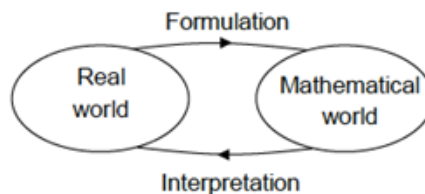


Mechanics Introduction

Essential information

- The process of considering a real world problem, formulating a mathematical problem, solving the mathematical problem and interpreting the solution in the context of the original problem is called Mathematical Modelling and is represented in the diagram below:



- A force on a particle can start motion, stop motion, change the direction of motion and make an object move faster or slower.
- The weight of an object of mass 1 kg is approximately 10 Newtons, that is
- $\text{weight} = mg$, where $g \approx 10 \text{ ms}^{-2}$
- Note that mass, in kg, is fixed does not change when you are in a different location but weight, in Newtons, changes depending where you are.
- Newton's Universal Law of Gravitation states that "Every object in the Universe attracts every other object in the Universe with a force, F , that has magnitude (or size) directly proportional to the masses of the particles, m_1 and m_2 , and inversely proportional to the square of their distance apart, d (the distance between their centres of mass); as given by the formula

$$F = \frac{Gm_1m_2}{d^2}$$

where the proportionality constant G is called the gravitational constant and in SI units has the value $G = 6.67 \times 10^{-11} \text{ m}^3 \text{ s}^{-2} \text{ kg}^{-1}$

- Dimensions, given in terms of M (mass), L (length) and T (Time) must balance across an equation.